Making Field Trips

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Podtastic!

Use of Handheld Wireless Technology Alleviates Isolation and Encourages Collaboration

Gotcha!" says Jay to himself. "Let's see … your fur is brown and white, you are really little and spunky, and you seem to love to run around."

As he snaps a photo, Jay thinks aloud while recording his observations in his scientific journal. Then he taps the screen of his handheld computer a few times and returns to his field trip home page. From his headphones he hears the voice of Greta, the tamarin monkey, asking him how many monkeys are in the cage with her. Jay enters the answer and says it aloud: "Four!"

Greta congratulates him on his correct answer and tells him how he can now follow her to the next exhibit—by tapping the link for the next podcast. Jay trots over to the chick hatchery, where two tiny chicks are just pecking out of their shells. As faint strains of barnyard music play in his ears, Greta explains to him how the incubator provides the right temperature for the hatchlings.

"This case is specially designed to keep chicks warm, like the mama hen normally would!" she says. Jay enters more observations in his journal and takes a digital picture of a still-wet, newborn chick taking its first steps.

"I can't wait to show this one to my friends!" he exclaims.

Jay is at the Boston Museum of Science, participating in a wireless, handheld field trip—a mix of podcasts, student multimedia creation, Web research, and interviewing—all centered on a common theme. We designed it as part of our research at the Harvard Graduate School of Education. (A video about the project is online.) The innovation allows a student to interact with museum exhibits in a guided, yet exploratory way. Greta, a live, cotton-top tamarin monkey who lives in one of the museum's exhibits, is simulated as a guide for Jay's field trip.

The interactive field trip was designed to increase both the amount of time students spend at exhibits and the depth of engagement with each exhibit. We term these two goals "increased time on exhibit" and "increased brain on exhibit."

The authors chose the Boston Museum of Science to test the module because the exhibits are designed to be highly interactive. Also, the entire museum is Wi-Fi-enabled, which allows for constant Web access throughout the facility.

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Podcasting

The convenient format, delivery, and accessibility of information offered by podcasting has made it a hot new trend. One of its limitations in educational applications, however, is its implementation primarily as a push technology—one that simply feeds users information. Podcasts tend to focus listeners inward and rarely encourage human interaction. In certain situations—such as on the subway—this isolation may be an intended goal of the listener. However, in a museum setting, the technology can be used to alleviate isolation by encouraging collaboration and interaction with others.

A thoughtfully designed podcast can increase time on exhibit and brain time on exhibit. Furthermore, with the inclusion of a few additional tools it can enable students to become even more invested in their own learning outcomes and performances of understanding.

A necessary component of a podcast is a device on which to play it. That device need not be an MP3 player; in fact, podcasts work quite well on handheld computers (e.g., a Pocket PC). Furthermore, properly equipped handheld computers afford students the ability not only to listen to a podcast, but also to:

- Take digital photos and videos.
- Record audio interviews of other museum staff and visitors, as well as ambient audio.
- Record notes in a variety of text and audio formats.
- Access additional information via the Internet on topics of their choosing.

By supplementing the podcast with the capabilities of the handheld computer, students can increase their

PHOTO COURTESY MUSEUM OF SCIENCE, BOSTON.

A student increases his time on exhibit after listening to the accompanying podcast.

interaction, enhance their engagement, and customize their learning experiences at the museum. The supplemented podcast encourages students to interact with exhibits, to extend content beyond the individual exhibits, and to link content themes with information from the Web. By studying previous research on the use of handheld computers in education, we designed a module that would be possible to replicate given the technical capabilities of the typical educator.

Pedagogy

The wireless, handheld field trip adds to the multi-sensory experience offered by the Museum of Science. The learning module we designed can be customized by both the educator and the student. The educator presents relevant content through a brief podcast, then provides an intermediate assessment via a short quiz question generated from facts about the particular exhibit. A correct entry "unlocks" the next podcast for the student. The subsequent podcast leads him on to the next exhibit relating to the educator's chosen theme. The concept for the thematic thread between exhibits requires scaffolding of knowledge and concepts, to give students a deeper learning experience than the traditional field trip offers.

The quiz questions are only a secondary, albeit immediate, means of assessment. Students demonstrate their understanding of the chosen topic primarily through a multimedia presentation to the community of learners, be it a classroom, a family, or team of students. The educator explains the culminating presentation in advance of the trip to the museum so students can be mindful of their responsibilities for it as they progress through the exhibits. This multimedia work provides students with rich artifacts from the learning experience. By synthesizing them, each student constructs his or her own knowledge. They increase the value of their experiences at the museum by exploring the exhibits aurally, visually, and physically. By using the podcasts, each student is able to experience the learning through varied pathways, in a way that individualizes the learning. Again, this individualization emphasizes the student-driven "pull" learning, while simultaneously providing an inquiry-based journey for them.

Beyond the advantages of customizing the learning experience for students, the handheld field trip supports several national educational standards. The integration of technological tools into a traditional field trip supports the National Educational Technology Standards, as well as contemporary skills of digital literacy, inventive thinking, and effective communication. Since educators create the content of the podcasts, they can align the experience with national and state curriculum standards as needed.

Technical Details

Throughout the design of this project, we kept technology within the range of the average educator. Specific technologies we used are easily accessible and platform-independent. We purchased no specialized hardware or software; rather, like most educators, we used tools available to us through our educational institution.

We created podcasts using hardware and software from the Learning Technologies Center at the Harvard Graduate School of Education. Hardware included headset microphones, shotgun microphones, lavalier microphones, and digital video cameras. Software included GarageBand, Final Cut Pro, and iTunes.

The specific handheld computer used was the Toshiba Pocket PC model e750. It runs the Microsoft Pocket PC 2003 operating system, and includes software and hardware for note-taking, audio recording through a built-in microphone, and audio playback using Windows Media Player. Students access the initial Web page in Pocket Internet Explorer (the Web browser bundled with the e750), where they click a link to download the audio tour file in MP3 format. The Web pages were written in static HTML, optimized for the limited screen size and limited graphics capability of a handheld computer. The quizzes were written in JavaScript. For external Web links, we attempted to find PDA-compatible sites of Web resources; for resources that did not have PDA-compatible versions of their sites, links to the "printable version" of a document provided a page that could be adequately viewed on the handheld. The digital still/video camera was a Veo PhotoTraveler that

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can be inserted into the CF II card slot on the e750; the drivers and software for the camera are available from the manufacturer's Web site.

Wi-Fi access not only simplifies the implementation of the field trip for the educator by allowing students to individually download audio files to their handheld devices (as opposed to the educator pre-loading the files on each handheld); a Wi-Fi-enabled location also gives students access to supplementary Web-based information.

The creation of a field trip module of this type requires a greater initial time commitment from educators, but one that pays large dividends. The handheld field trip has the potential to reduce the level of active instruction during the field trip, while simultaneously increasing student engagement. Most important, the field trip of this type has the potential to significantly increase student understanding.

Future Applications

The power of this model is in its simplicity and, therefore, its flexibility. Although we chose the Boston Museum of Science as a site and targeted grade-school students, high-school marine science students, and high-school physics students, a handheld field trip need not be limited to school groups on field trips to museums. Other applications might include any of the following:

- After-school program educators could create a similar module for describing and documenting the history of the local neighborhood.
- Adult educators in botanic gardens could create season-specific modules for the gardens.
- Museum educators could create modules for all age groups based on specific themes.
- Students themselves could create modules just for fun to learn more about a topic, or as a means of assessment.

Because most students are already familiar with the necessary tools, they would thrive on the artistic and technical elements of creating a handheld field trip. The range of applications is limited only by the imagination of the creators.

Resources

Dieterle, E., & Dede, C. (2006). Building university faculty and student capacity to use wireless handheld devices for learning. In M. Hooft & K. Swan (Eds.), *Ubiquitous computing in education: Invisible technology, visible impact.* Mahwah, NJ: Lawrence Erlbaum Associates.

Dieterle, E., Dede, C., & Schrier, K. (2007). "Neomillennial" learning styles propagated by wireless handheld devices. In M. Lytras & A. Naeve (Eds.), *Ubiquitous and pervasive knowledge and learning management: Semantics, social networking and new media to their full potential.* Hershey, PA: Idea Group, Inc.

Harvard School of Education project: http://gsevserv.harvard.edu/ramgen/t502/cd_t502_podcast.rm.

Klopfer, E., Perry, J., Squire, K., Jan, M., & Steinkuehler, C. (2005). Mystery at the museum: A collaborative game for museum education. Proceedings of the 2005 conference on computer support for collaborative learning: *Learning 2005: The next 10 years*, 316–320: http://portal.acm.org/citation.cfm?id=1149334

Klopfer, E., Squire, K., & Jenkins, H. (2003). *Augmented reality simulations on handheld computers.* Paper presented at the 2003 AERA, Chicago, IL.

Lemke, C., Coughlin, E., Thadani, V., Martin, C., Burkhardt, G., Monsour, M., et al. (2003). *enGauge 21st century skills: Literacy in the digital age.* Naperville, IL: NCREL: http://www.ncrel.org/engauge/skills/match4.htm

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